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scale. They used the metric scale, but they measured 46 kilograms to the quintal, and 46 kilograms is not exactly the old quintal.

That we must, and furthermore that we shall, come to the metric system is to my mind beyond question. First, because the exigencies of our foreign trade make it impossible for us to do otherwise, and second, because the present system is too cumbersome, too uncertain, too complicated and too difficult to learn even for our domestic uses. At the present time one may discern evidences of senility and breaking down in the constant and increasing multiplication of standards. Almost every fruit and vegetable now has its own container and these containers are becoming the customary and in many cases the legal standard of measure in purchase and sale.

We can not help ourselves in the foreign trade, for there we must come to the metric system. It is, of course, quite possible to have two systems, such as, in fact, exist in England to-day, and even in this country, although in a lesser degree. English manufacturers engaged in foreign trade work almost exclusively in the metric scale. In some cases English factories work in two scales, one for the foreign and one for the domestic trade. In the United States we are coming to the same condition.

The United States, Great Britain and Russia are almost the only countries now outside the fold of the metric system. Russia is only nominally outside, for nearly all Russian mechanical industry and the overwhelming proportion of its foreign trade is unchangeably based on the metric system. Prior to the war Great Britain had for practical purposes adopted the metric system in manufactures for foreign trade. Since the war the metric system has extended into other fields of commerce even into the domestic trade. In the United States the progress has been less rapid, but our factories have turned out enormous supplies of war material manufactured to the metric scale, and to-day thousands upon thousands of our workmen are as familiar with centimeters and grams as they were formerly familiar with inches and ounces.

THE METRIC SYSTEM IN EVERY-DAY LIFE

By Professor H. V. Arny, Ph.D.
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THERE seems but little that I can add to the admirable addresses delivered by the distinguished men who have just presented their views. In fact, all I can do is to present a simple story of my own experiences with that beautiful, logical and simple system of weights and measures now used by 437,000,000 of the people of this globe.

In school, as a twelve-year-old youngster, along with other monstrosities such as cube root, proportions involving the wildly exciting facts that if ten men in seven days could excavate a ditch 1,000 feet long; then three men in twelve days could excavate *X* feet of trenches, I learned that there was a foreign thing called the metric system; that it dealt with "decis" and "centis" and "kilos" and "millis" and "dekas"; that the thing they called the kilogram represented 2.2046 pounds, that the kilometer was 0.6213 miles. These data passed through the mind of the lad and along with cube root were shortly consigned by him to the limbo of uninteresting and unnecessary things.

Later, as a pharmaceutical apprentice, I learned that this self-same metric system was used by the French physicians of the neighborhood in writing their prescriptions and there then came the first intimation that metric weights were of some practical use. Later in college, all pharmaceutical preparations were prepared by metric units and a month of use of such weights and measures brought a realization that their decimal subdivisions made them as superior to the ordinary units of weights and measures as dollars and cents are easier to calculate than are pounds, shillings and pence.

Later, four years' residence in Germany completed my metric conversion. In truth it might be stated that the first week did the work, since any one accustomed to our decimal system of currency finds that *thinking* in the metric system is merely the matter of *using* the units. In using the meter, one learns that it approximates the yard; in using the kilogram, the novice instinctively thinks of two pounds; in discussing distance in kilometers, one quickly comes to the realization that the unit means about five eighths of a mile. And after a few weeks of such mental translating, one drops all thought of old units and thinks of quantities exclusively in kilos and meters.

Despite assertions to the contrary, I found in Germany, barely twenty-five years after the official adoption by that country of the metric system, that all purchases I made were on the basis of the metric system. It is true that in the market places, the peasants talk of "Pfunds" (pounds), but it is equally true that their "Pfund" is the official half-kilo weight. Nor do we have to cross the ocean to find such anachronisms. In certain sections of this land we hear the silver quarter called the shilling; in other parts of the land it is called "two-bits"; while it is an undeniable fact that in one city the five-cent piece is still called to a certain extent "the picayune," after a Spanish coin of six and a quarter cents value, that was used in that section a century ago. Nor do I believe that these colloquialisms prove the failure of our decimal system of currency.

The only justification for the adoption of the metric units as the official standard of this country is: (*a*) The development of our foreign trade demands the change. (*b*) The saving of time brought about by the use of the metric system would repay the annoyance incidental upon the change.

The first proviso has been emphatically answered by the speakers who have preceded me; but I can add some testimony as to the time-saving properties of the system.

As to this there have been a number of extravagant statements made by metric enthusiasts, but figures founded on experimental work have been rare. Accordingly a comparative test of the same problems expressed in United States and metric units was made on third-year university students by having them solve the following commercial problems.

In order to eliminate the problem of fatigue, half of the students were given the metric, the other half were given the United States problems first.

As to the problems themselves, the first four are ordinary transactions of retail trade. All eight of these (United States and also metric) could be calculated within three minutes and while metric units showed an advantage, it was so slight that the difference could be expressed only in seconds. The next two of each set involve practical problems of the chemical industry where liquids bought by the pound frequently are dispensed in gallons. The last problem is taken from the *Outlook* of November 16, 1916, where the author of an article published in a previous issue apologized for an error made in calculating the cubical capacity of the eight billion dollars claimed to represent the gold coin of the world. He acknowledged that while his article stated that eight billion dollars represented a cube of gold seventy feet on each side, the real figures were a cube of twenty-nine feet, or 25,641 cubic feet.

If a distinguished financial publicist could make such an error, I was curious to see what a class of students could do with it in both systems. The figures below show that the honors were even, although it is only fair to say that in the metric problem two were ruled out because of the improper placing of the decimal point.

The results of the experiments are tabulated below.

PROBLEMS BASED ON METRIC UNITS

1. Cost of 22 tubes of tooth paste at $1.45 a "dizaine" (a package of 10).
2. Cost of 2.26 kilos of quinine sulphate at 4.7 cents a gram.
3. Cost of 27 kilos of coal at $7.70 a metric ton (1,000 kilos).
4. Cost of 1.7 meters of cloth at 26 cents a meter.
5. Cost of 7.27 liters of glycerin (sp. gr. 1.25) at 44 cents a kilo.
6. Cost of 5 liters of sulphuric acid (sp. gr. 1.84) at 22 cents a kilo.
7. A gold dollar contains 1.67 gm. gold. How many meters of gold (sp. gr. 19) would represent eight billion dollars?

PROBLEMS BASED ON ORDINARY (UNITED STATES) UNITS

1. Cost of 22 tubes of tooth paste at $1.75 a dozen.
2. Cost of 5 lbs. (avoirdupois) of quinine at $1.45 an avoirdupois ounce.
3. Cost of 59 lbs. of coal at $7.00 a ton.
4. Cost of 70 inches of cloth at 24 cents a yard.
5. Cost of two gallons of glycerin (sp. gr. 1.25) at 20 cents an avoirdupois lb.
6. Cost of 1⅜ gallons sulphuric acid (sp. gr. 1.84) at 10 cents an avoirdupois pound.
7. A gold dollar weighs 25.8 grains. How many cubic feet of gold (sp. gr. 19) would represent eight billion dollars?

RESULTS OF THE TEST

On Group I

Student	Metric		U. S. Measures	
	Time	Correct Out of Six	Time	Correct Out of Six
A	15 minutes	5	21 minutes	4
B	13 “	3	18 “	4
C	11 “	6	18 “	5
D	15 “	1	14 “	3
E	18 “	2	13 “	3
F	10 “	4	23 “	5
G	8 “	6	16 “	5
H	8 “	4	10 “	3
I	12 “	6	22 “	4
J	7 “	3	16 “	3
K	8 “	6	13 “	6
L	9 “	4	18 “	3
M	24 “	4	12 “	1
N	13 “	3	13 “	3
	171 minutes	68%	227 minutes	62%

RESULTS OF THE TEST

On Group II

Student	Metric		U. S. Measures	
	Time	Correct Out of 7	Time	Correct Out of 7
A	19 minutes	5	42 minutes	6
B	30 “	4	36 “	5
C	25 “	4	39 “	5
D	19 “	5	26 “	4
E	23 “	5	28 “	5
F	21 “	6	47 “	4
G	26 “	6	33 “	2
H	24 “	2	42 “	1
I	30 “	5	37 “	5
J	22 “	7	27 “	6
K	20 “	4	54 “	3
L	14 “	7	27 “	5
M	28 “	3	30 “	5
N	15 “	6	35 “	7
O	22 “	6	37 “	4
P	22 “	6	39 “	6
	360 minutes	72%	579 minutes	65%

The figures just given show that one class of third-year university students did the first six problems in United States units in 227 minutes, the similar metric problems took only 171 minutes; that, while a second group did all seven problems in United States units in 579 minutes, they took only 360 minutes to do the same problems in metric units. It will also be noticed that the percentage of correct problems in the metric system is somewhat higher than those done with United States units; hence the metric system is not only a tremendous time-saver, but gives in the hands of the average student more accurate results.

Enough, I think, has been said about the advantages of the metric system. Our presence here to-day attests to our belief that we should in the due course of time become a metric country. And now that we have come together, what are we going to do? It would be the worst of blunders if we, representing such diversified occupations, should not, before we separate, form a permanent organization aimed to disseminate the metric gospel among other commercial bodies until they too agree with us that it is high time for this country of ours to throw off the shackles of an Elizabethan set of standards and add our 110,000,000 people to the 437,000,000 already using the metric system.

THE METRIC SYSTEM FROM THE STANDPOINT OF THE WHOLESALE GROCERS AND CANNING INDUSTRY

By FRED. R. DRAKE

EASTON, PA.

THE National Wholesale Grocers Association of the United States, with eleven hundred members in the forty-eight states of the Union, is now in its eleventh year and was organized at Buffalo in 1906 to advance the welfare of the wholesale grocery trade.

In 1912 at our St. Louis convention we began a campaign of education on the metric system looking to its eventual compulsory adoption by congressional enactment as soon as the electorate could be educated to a knowledge of its desirability.

This work has been carried on under the direction of our pure food and legislative committee by a subcommittee on metric system. Of this latter committee I have had the honor and pleasure of being chairman.

In 1912 many of our members were not fully informed as to the exact status of the metric system in the United States and before beginning our campaign of education, our committee undertook an exhaustive examination of literature on the subject as well as an investigation of